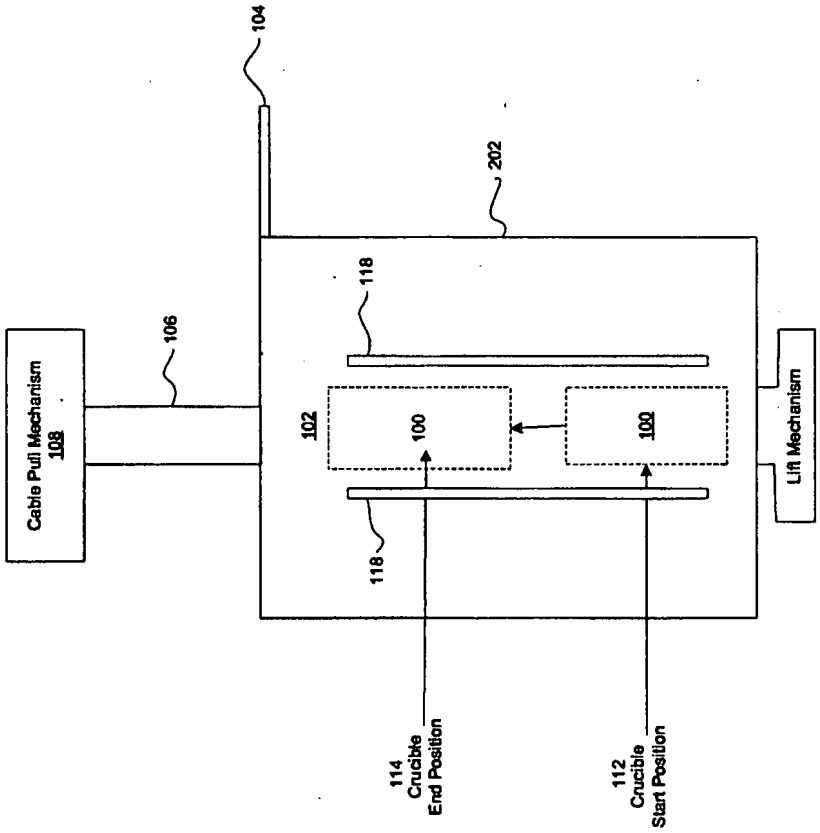
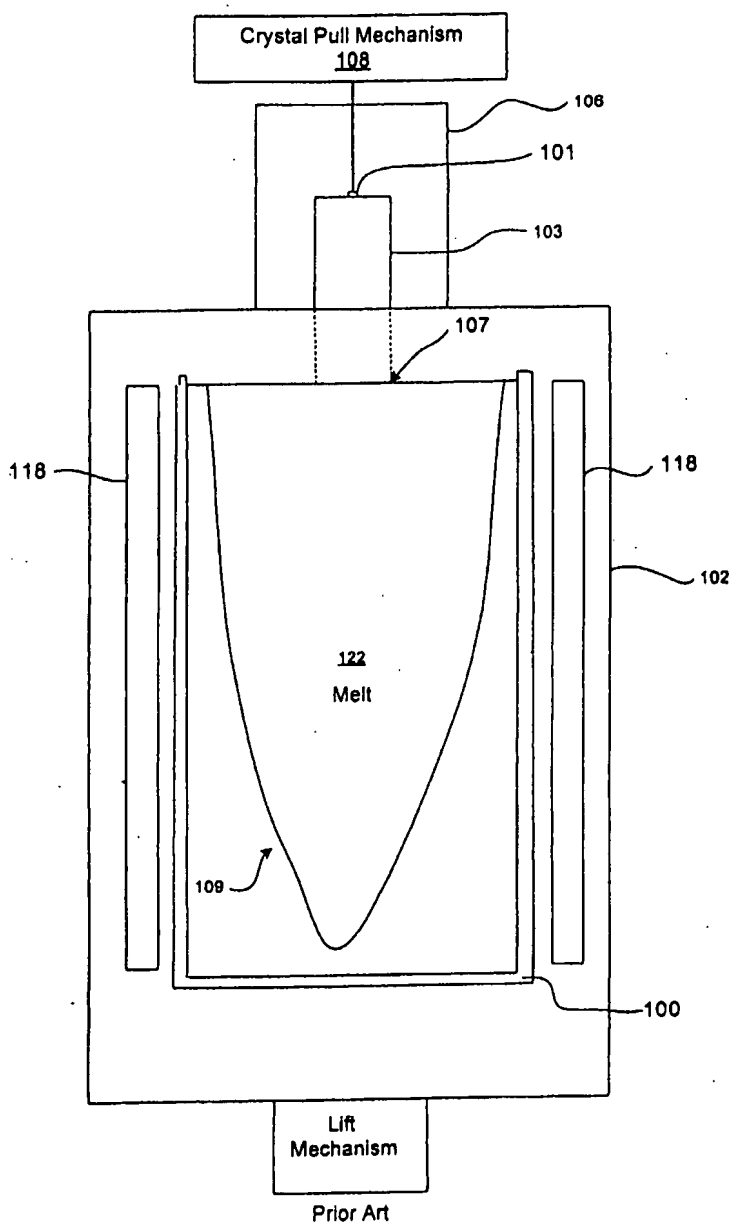



Prior Art
Fig. 1A




Prior Art

Fig. 1B

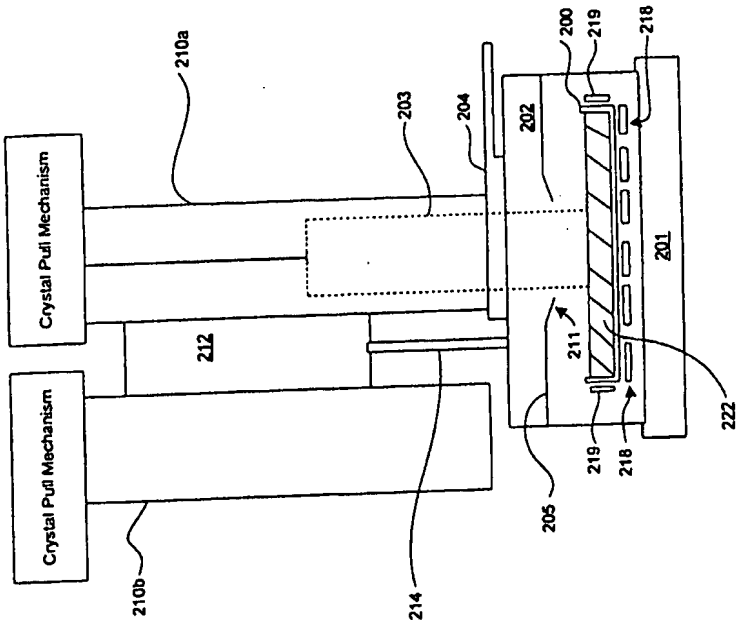

Crystal Pull Mechanism
Crystal Pull Mechanism
210a
210b
212
214
203
204
202
200
219
218
201
211
205
222
Low Aspect Ratio Crucible

Fig. 2

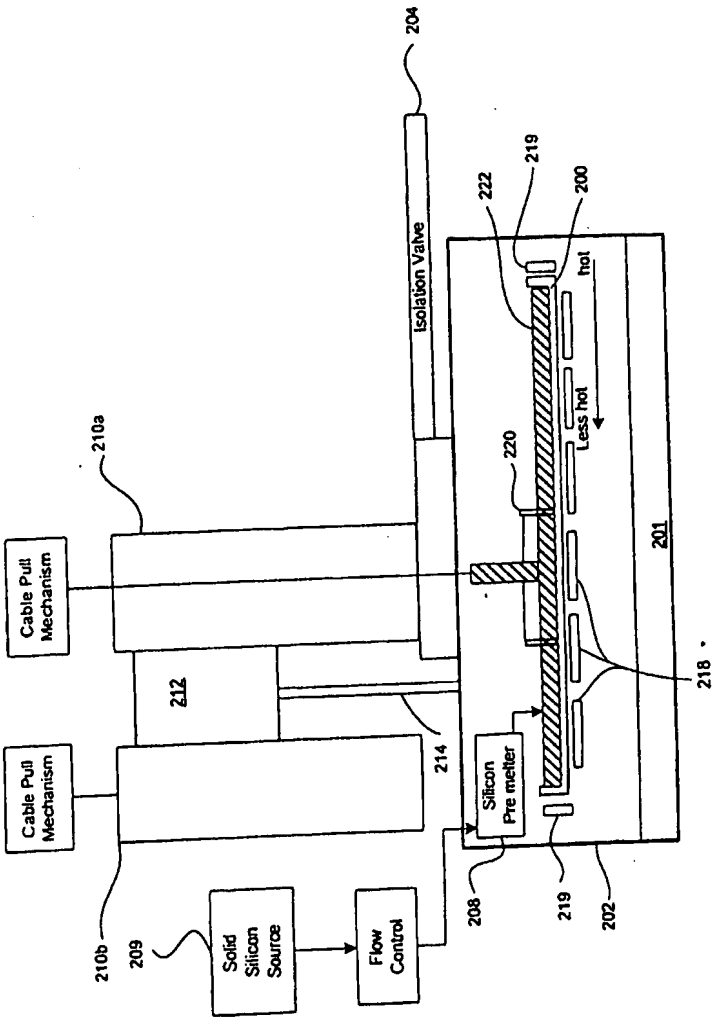

204
Isolation Valve
222
219
200
hot
Less hot
220
201
218
210a
Cable Pull Mechanism
212
214
Cable Pull Mechanism
Silicon Pre melter
208
219
202
210b
209
Solid Silicon Source
Flow Control

Fig. 3A

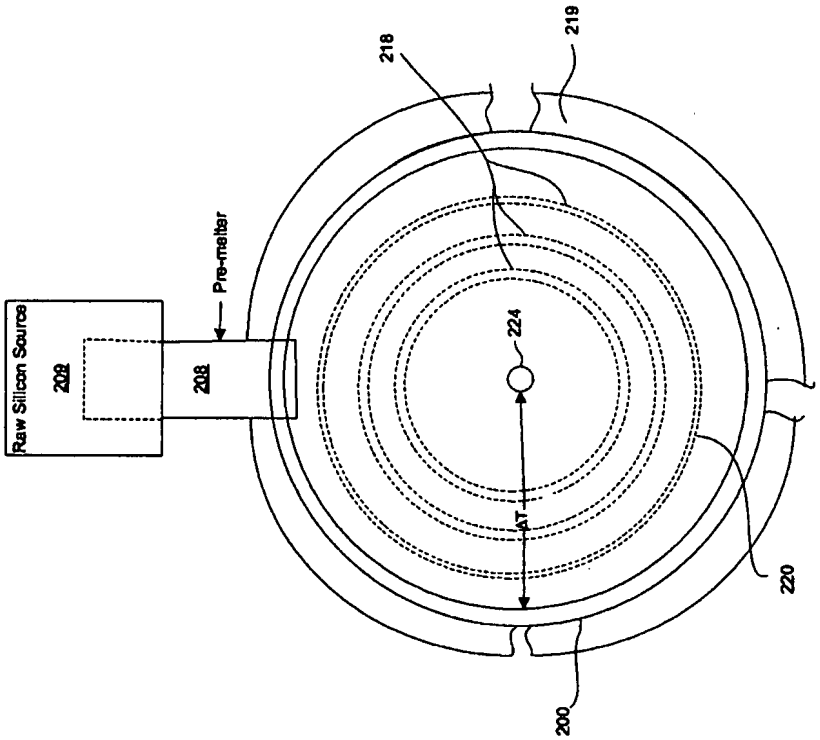



Fig. 3B

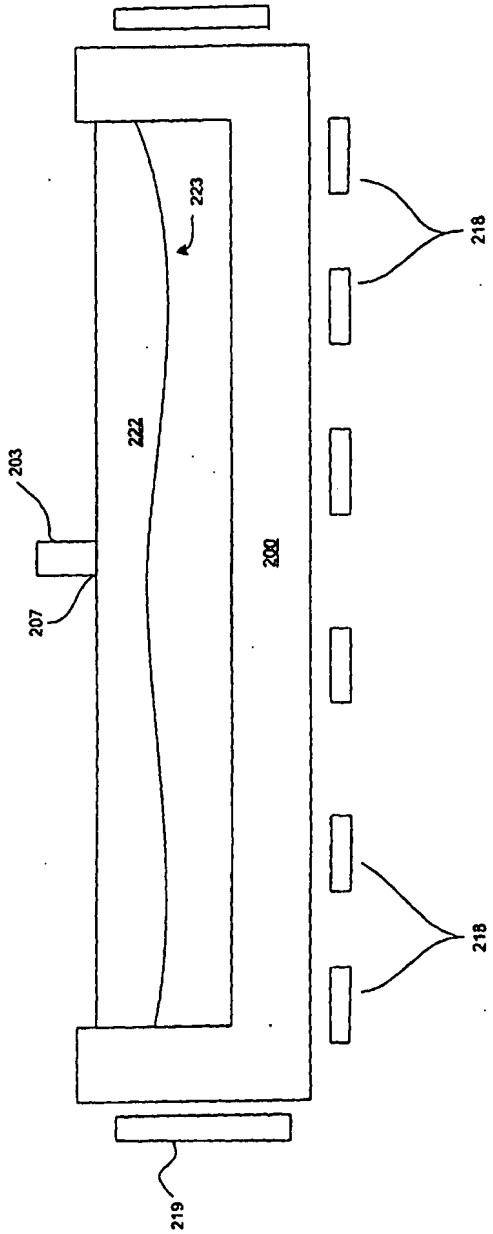



Fig. 3C

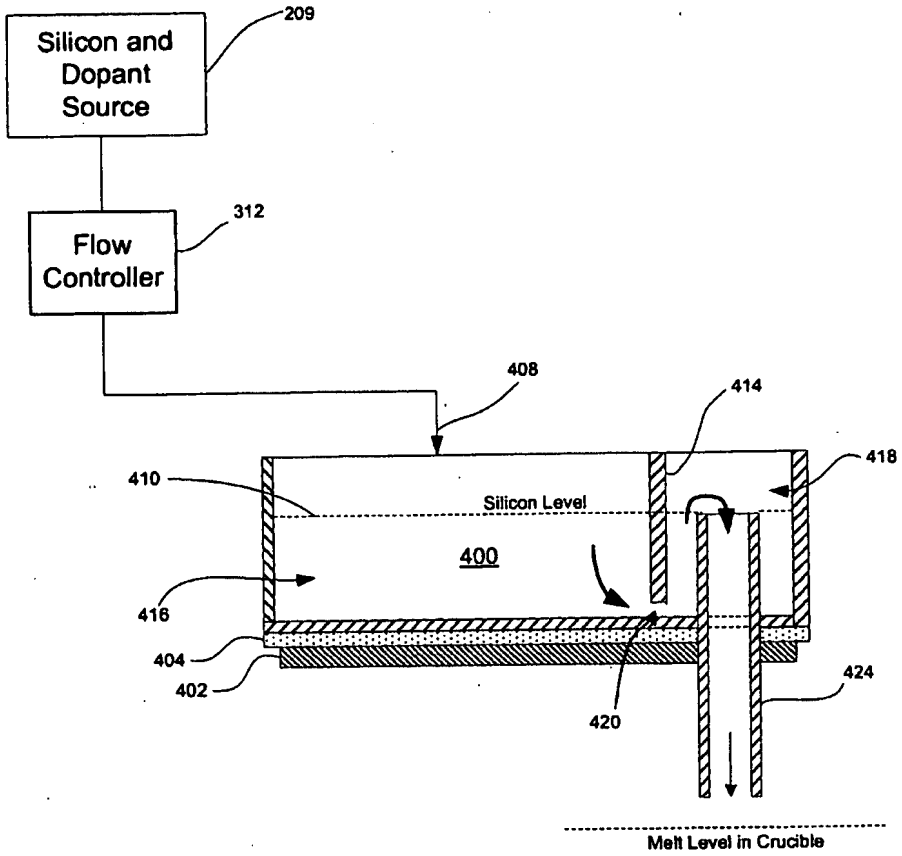

Silicon and Dopant Source
209
Flow Controller
312
408
414
418
410
Silicon Level
400
416
404
402
420
424
Melt Level in Crucible

Fig. 4

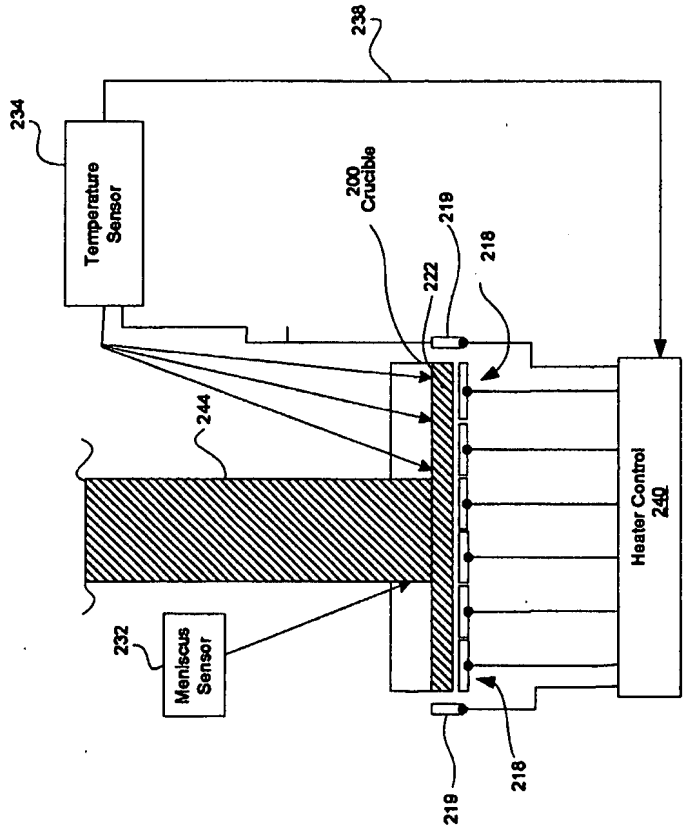

238
234
Temperature Sensor
200 Crucible
219
218
222
244
Heater Control 240
232
Meniscus Sensor
219
218

Fig. 5

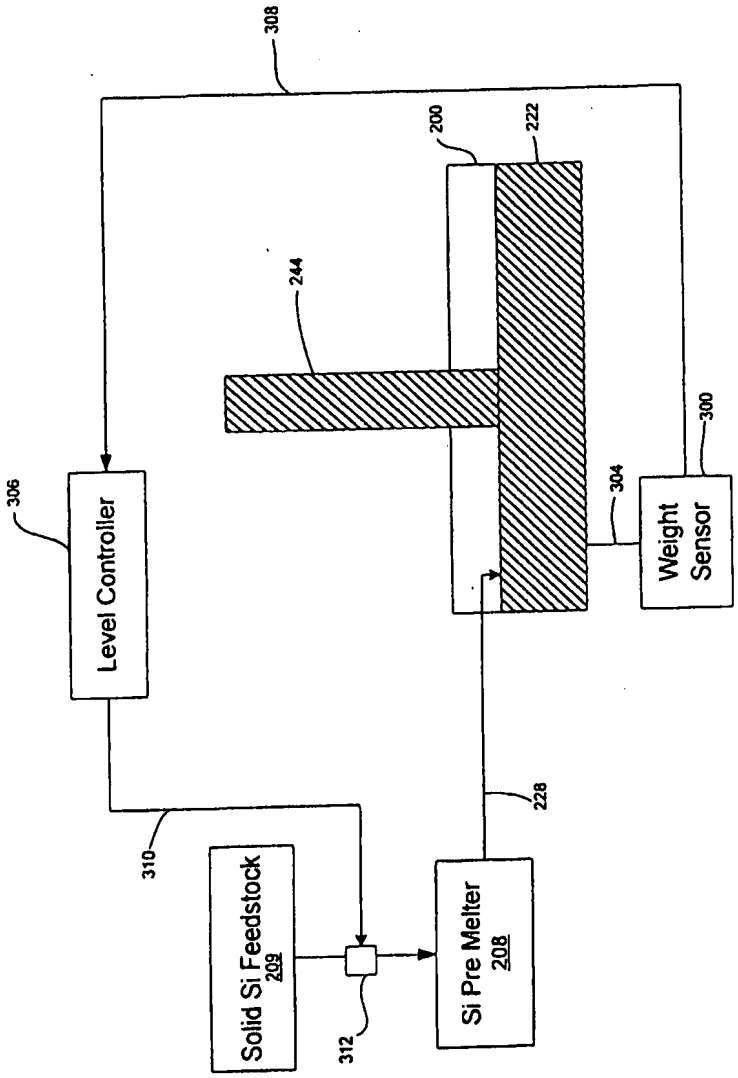

308
200
222
244
300
304
306
Level Controller
Weight Sensor
228
310
Solid Si Feedstock
209
312
Si Pre Melter
208

Fig. 6